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(54) **DISPLAY SYSTEM AND ELECTRONIC DEVICE**

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USPC **358/1.15**

(57) **ABSTRACT**

A display system includes an image forming apparatus, and a tablet terminal transmitting/receiving information to/from image forming apparatus through wireless communication. The Image forming apparatus detects the tablet terminal, and establishes wireless communication with the detected tablet terminal through a wireless communication driver. When wireless communication is established, the image forming apparatus transmits a display request requesting display of operation information (operation manual) related to the currently ongoing operation, to the tablet terminal. Receiving the display request transmitted from the image forming apparatus, the tablet terminal displays the requested operation information (manual) of the operation manual.

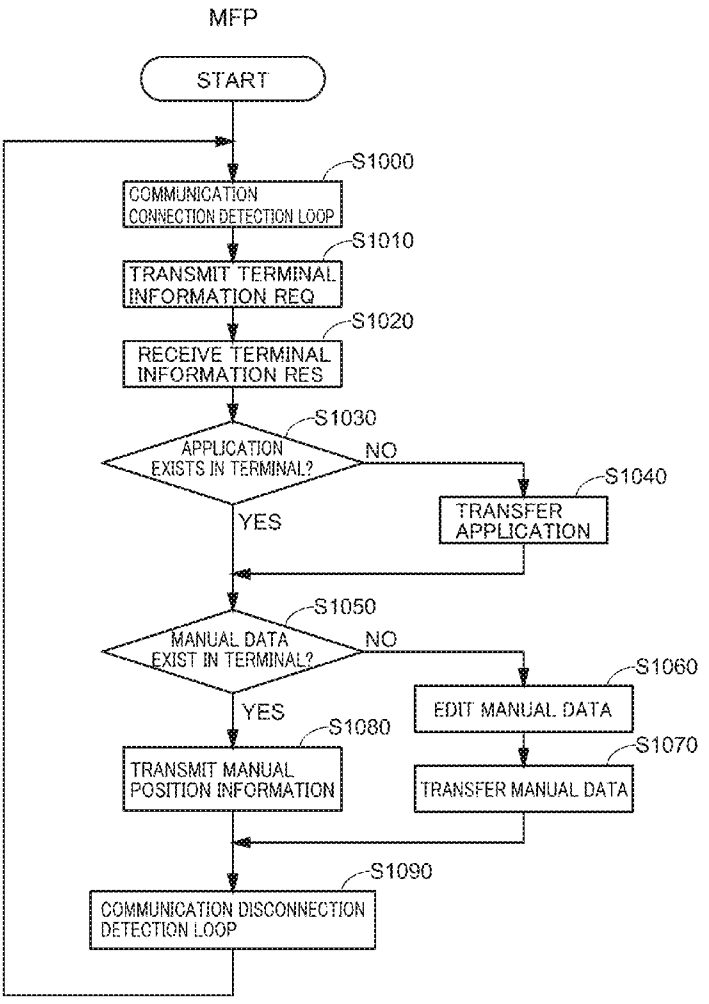


FIG. 1

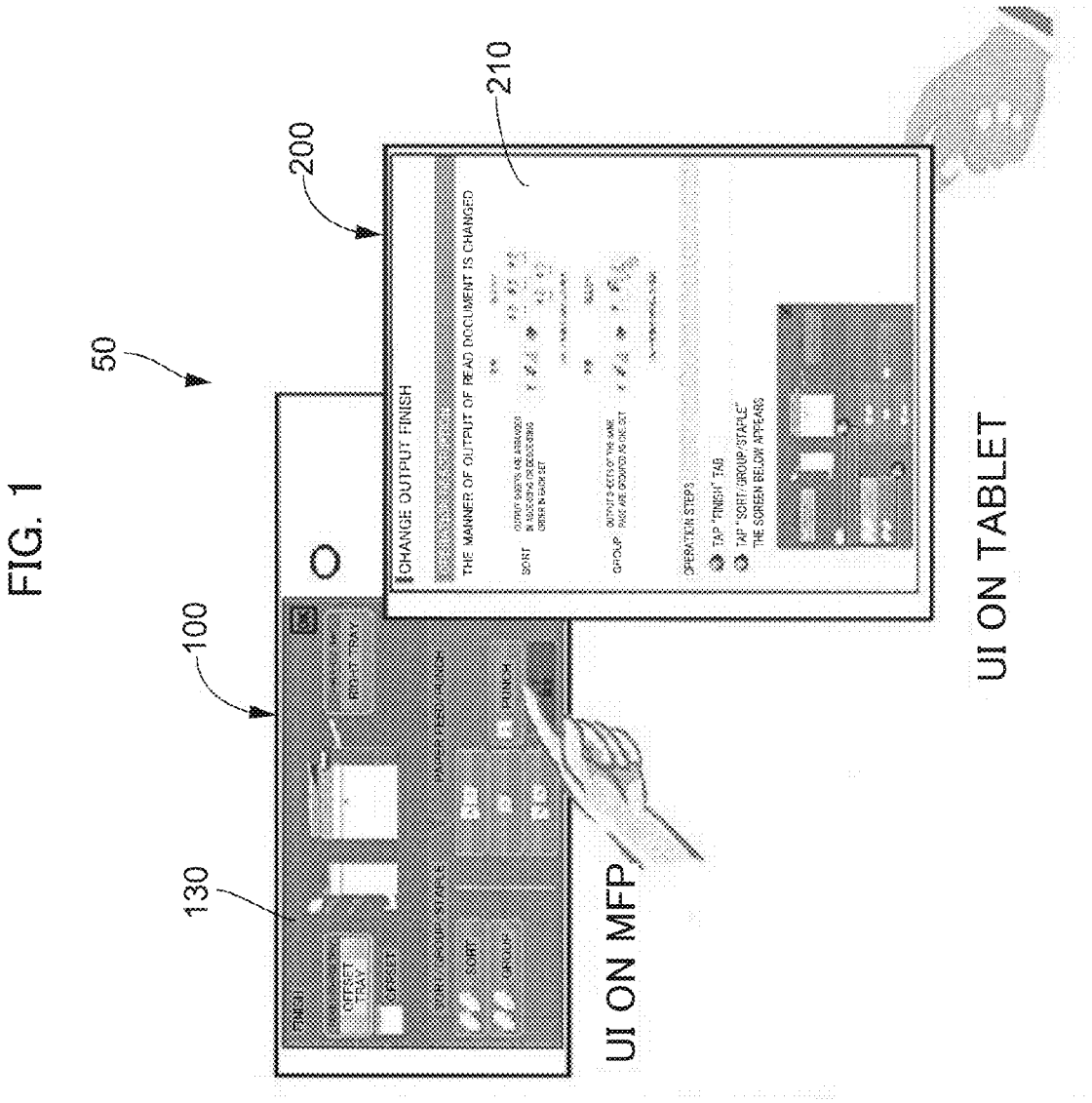

50
100
130
200
210
CHANGE OUTPUT FINISH
THE MANNER OF OUTPUT OF READ DOCUMENT IS CHANGED
SORT
GROUP
OPERATION STEPS
TAP "FINISH" TAB
TAP "SORT/GROUP/STAPLE"
THE SCREEN BELOW APPEARS
UI ON MFP
UI ON TABLET

FIG. 2

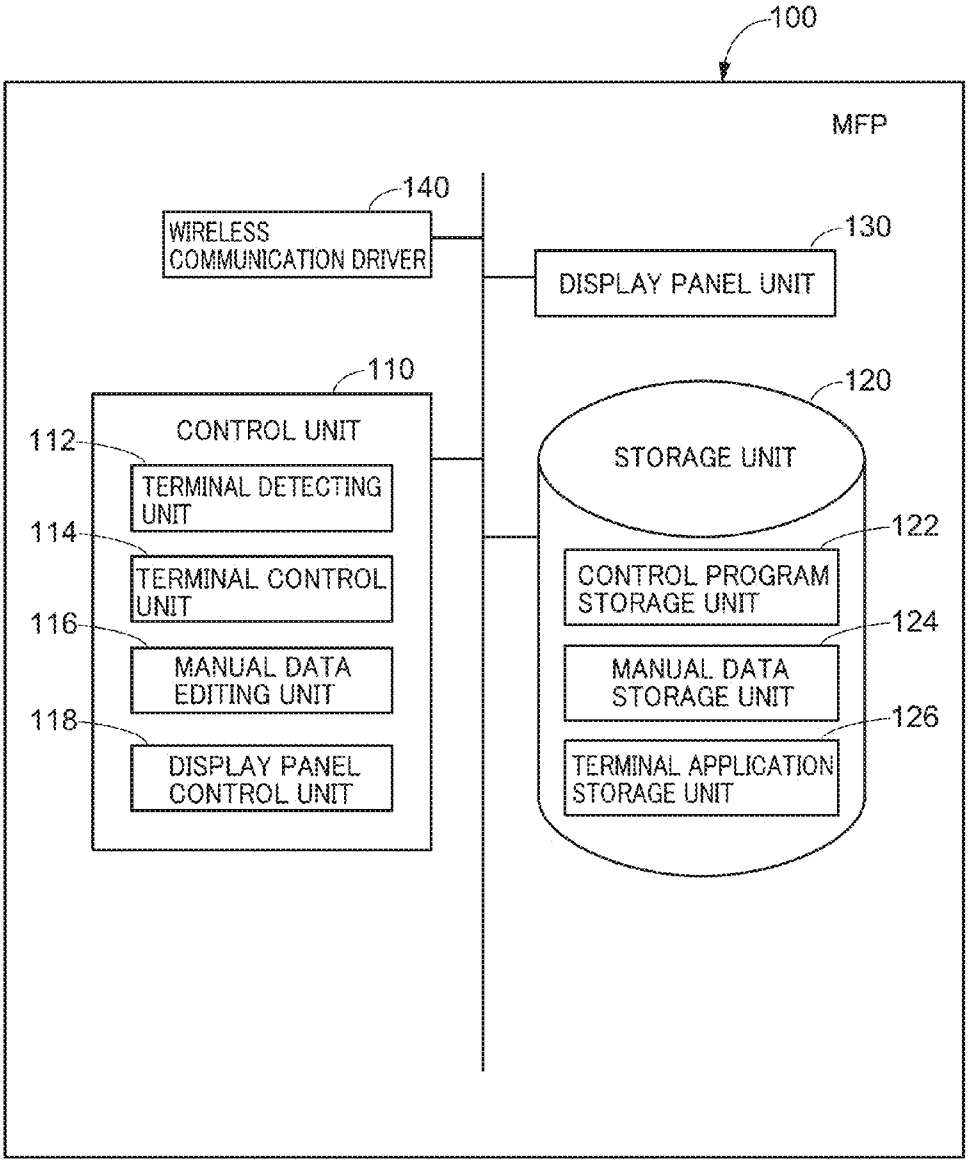

100
MFP
140
WIRELESS COMMUNICATION DRIVER
130
DISPLAY PANEL UNIT
110
CONTROL UNIT
112
TERMINAL DETECTING UNIT
114
TERMINAL CONTROL UNIT
116
MANUAL DATA EDITING UNIT
118
DISPLAY PANEL CONTROL UNIT
120
STORAGE UNIT
122
CONTROL PROGRAM STORAGE UNIT
124
MANUAL DATA STORAGE UNIT
126
TERMINAL APPLICATION STORAGE UNIT

FIG. 3

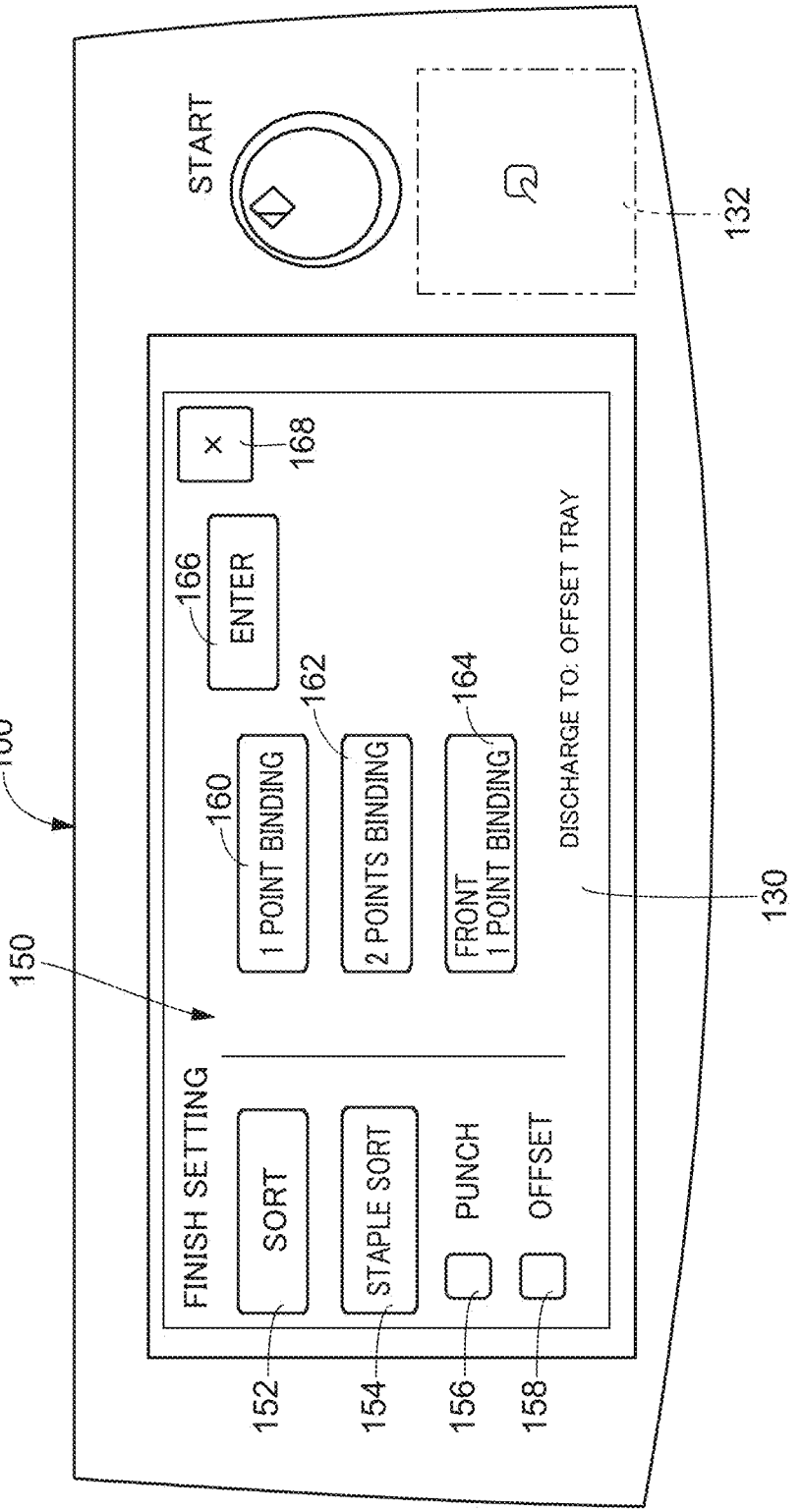

100
150
START
132
130
DISCHARGE TO: OFFSET TRAY
FINISH SETTING
SORT
STAPLE SORT
PUNCH
OFFSET
1 POINT BINDING
2 POINTS BINDING
FRONT
1 POINT BINDING
ENTER
×
152
154
156
158
160
162
164
166
168

FIG. 4

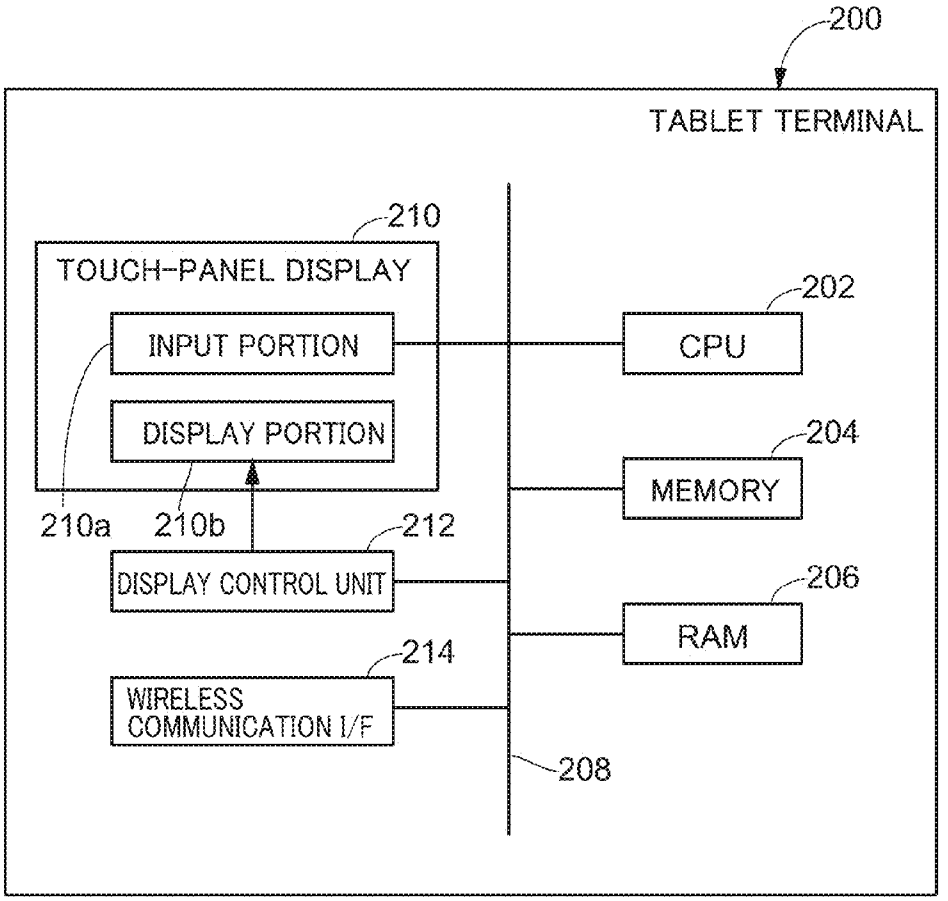

200
TABLET TERMINAL
210
TOUCH-PANEL DISPLAY
INPUT PORTION
DISPLAY PORTION
210a
210b
212
DISPLAY CONTROL UNIT
214
WIRELESS COMMUNICATION I/F
202
CPU
204
MEMORY
206
RAM
208

FIG. 5

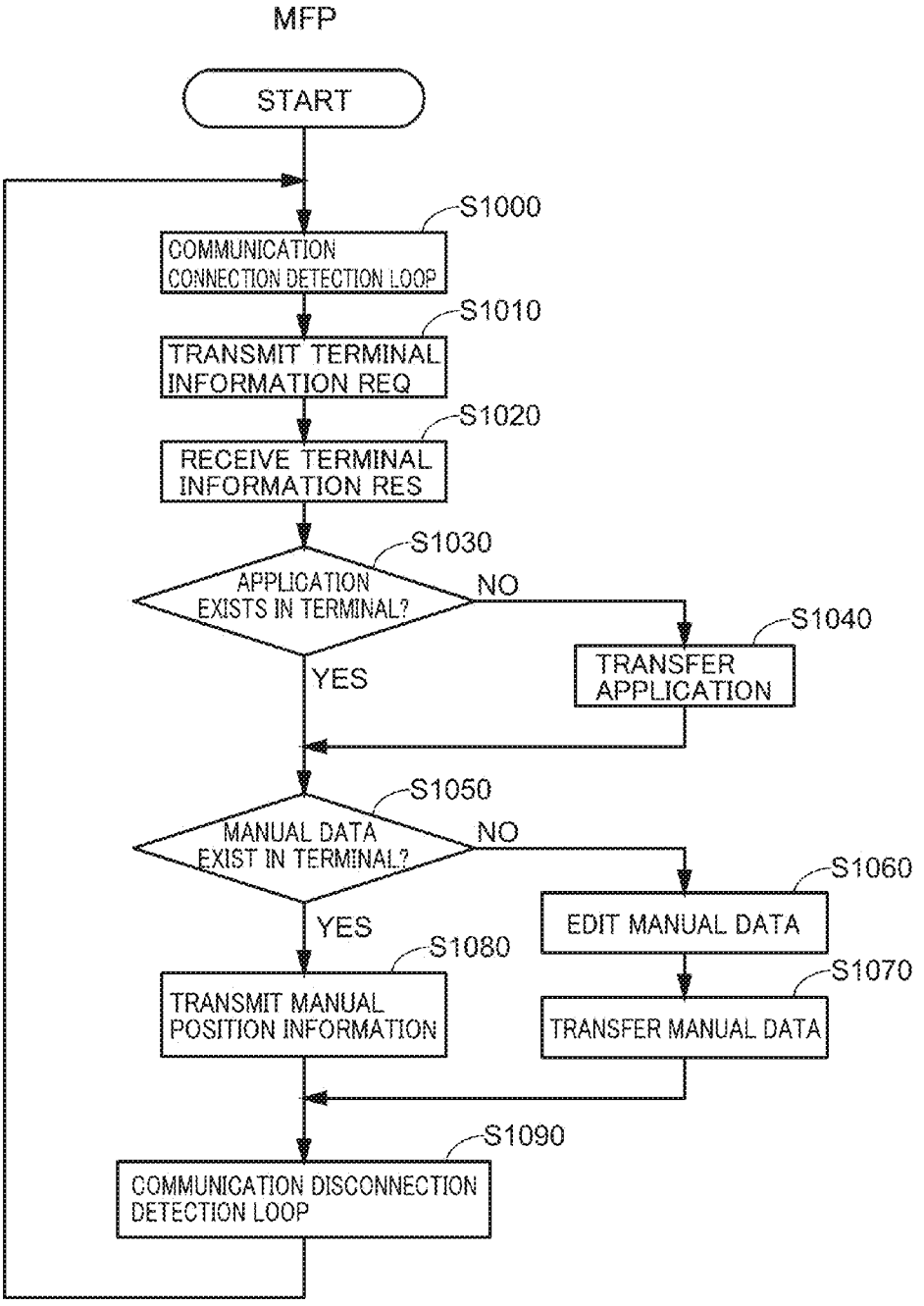

MFP
START
S1000
COMMUNICATION CONNECTION DETECTION LOOP
S1010
TRANSMIT TERMINAL INFORMATION REQ
S1020
RECEIVE TERMINAL INFORMATION RES
S1030
APPLICATION EXISTS IN TERMINAL?
NO
YES
S1040
TRANSFER APPLICATION
S1050
MANUAL DATA EXIST IN TERMINAL?
NO
YES
S1060
EDIT MANUAL DATA
S1070
TRANSFER MANUAL DATA
S1080
TRANSMIT MANUAL POSITION INFORMATION
S1090
COMMUNICATION DISCONNECTION DETECTION LOOP

FIG. 6

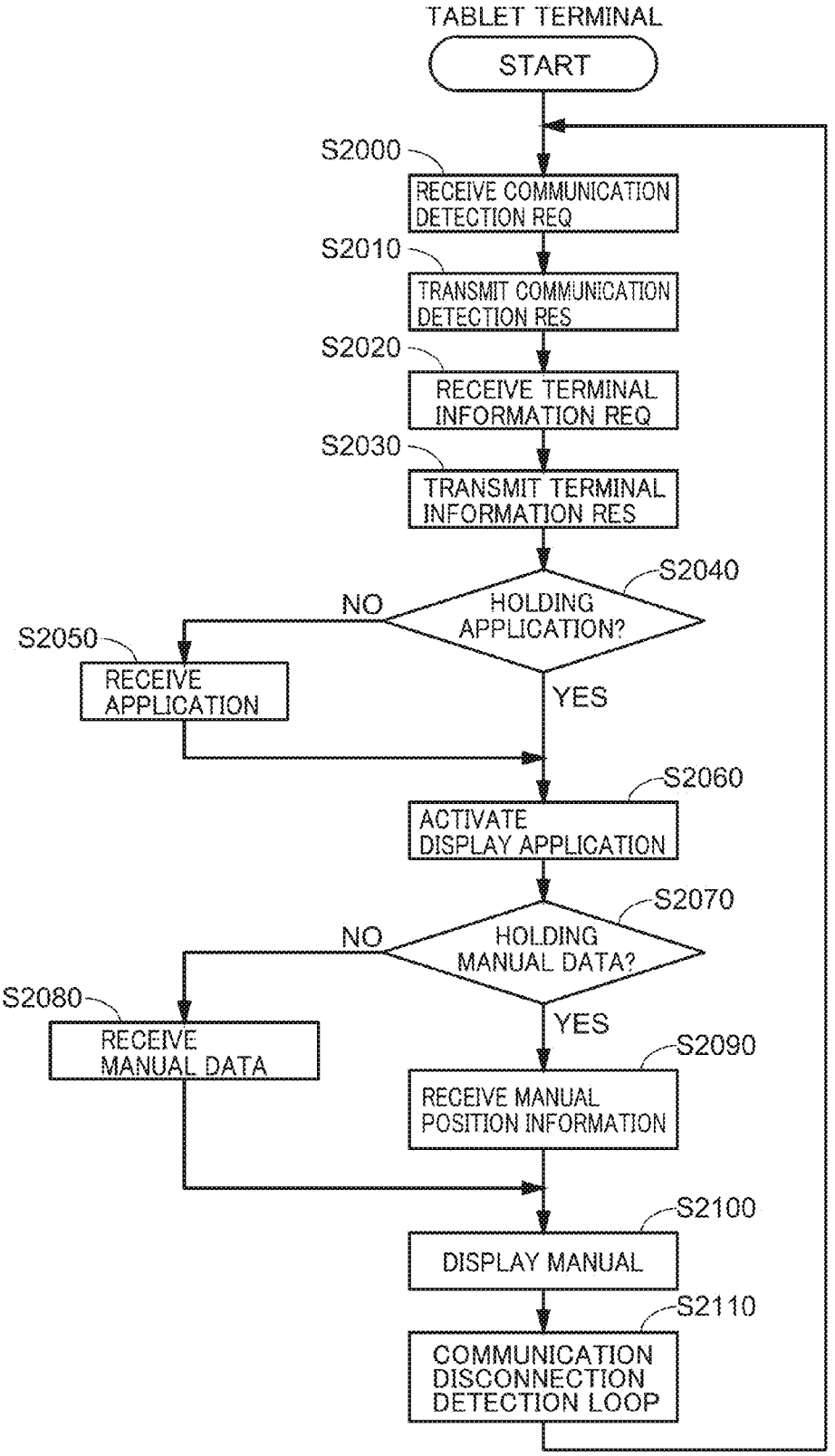

TABLET TERMINAL
START
S2000
RECEIVE COMMUNICATION DETECTION REQ
S2010
TRANSMIT COMMUNICATION DETECTION RES
S2020
RECEIVE TERMINAL INFORMATION REQ
S2030
TRANSMIT TERMINAL INFORMATION RES
S2040
HOLDING APPLICATION?
NO
S2050
RECEIVE APPLICATION
YES
S2060
ACTIVATE DISPLAY APPLICATION
S2070
HOLDING MANUAL DATA?
NO
S2080
RECEIVE MANUAL DATA
YES
S2090
RECEIVE MANUAL POSITION INFORMATION
S2100
DISPLAY MANUAL
S2110
COMMUNICATION DISCONNECTION DETECTION LOOP

FIG. 7

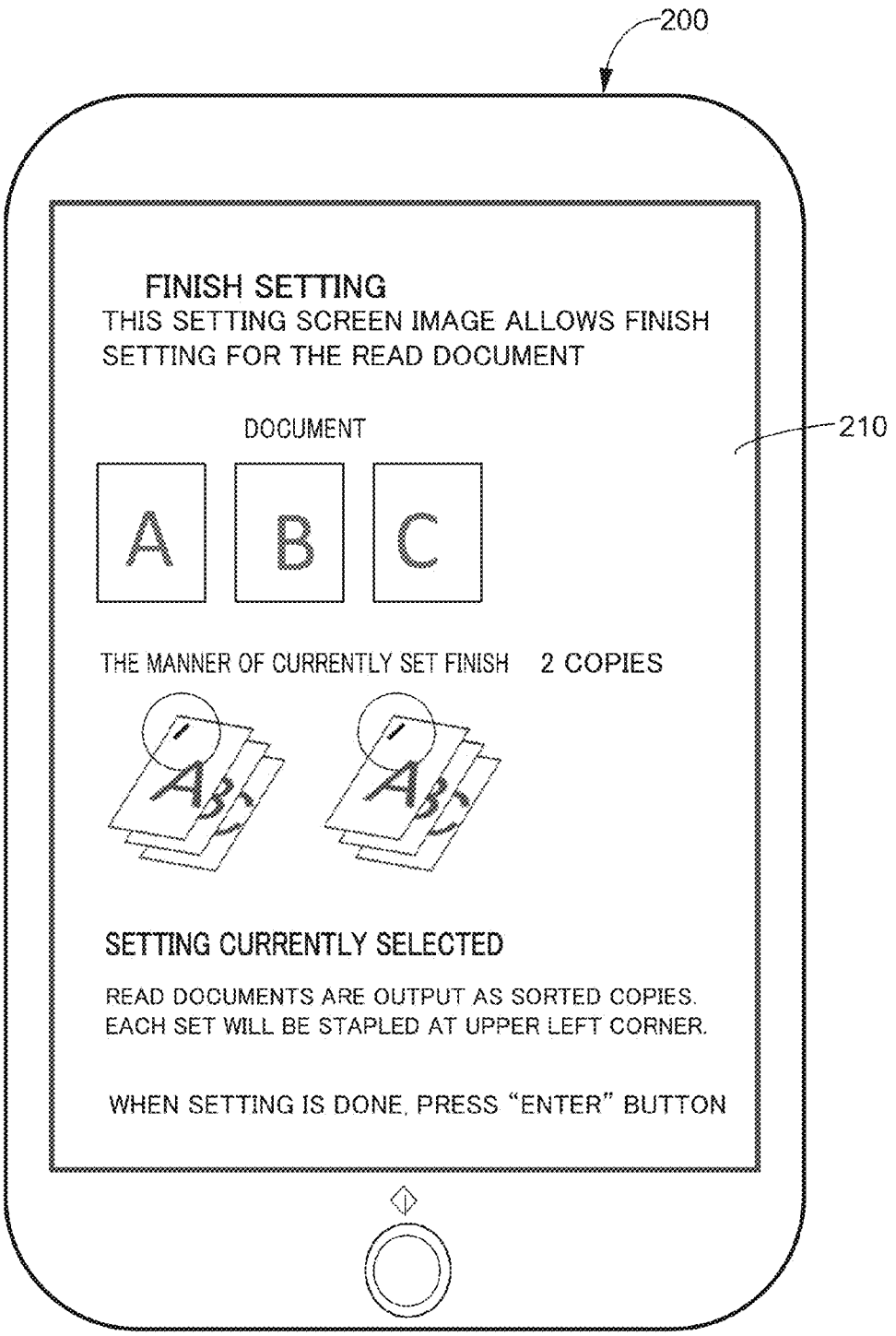

200
FINISH SETTING
THIS SETTING SCREEN IMAGE ALLOWS FINISH SETTING FOR THE READ DOCUMENT
DOCUMENT
A
B
C
210
THE MANNER OF CURRENTLY SET FINISH
2 COPIES
SETTING CURRENTLY SELECTED
READ DOCUMENTS ARE OUTPUT AS SORTED COPIES. EACH SET WILL BE STAPLED AT UPPER LEFT CORNER.
WHEN SETTING IS DONE, PRESS "ENTER" BUTTON

FIG. 8

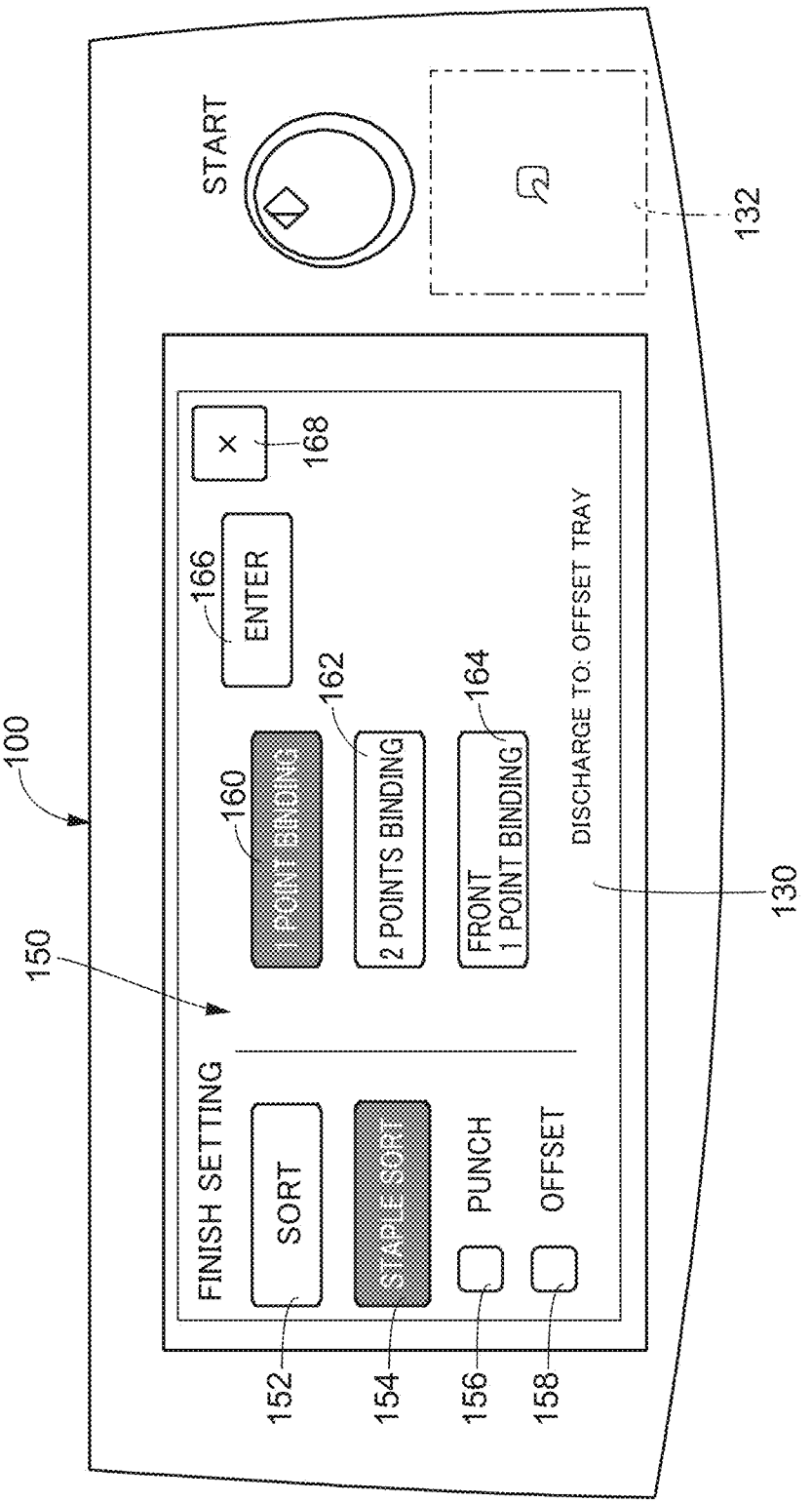
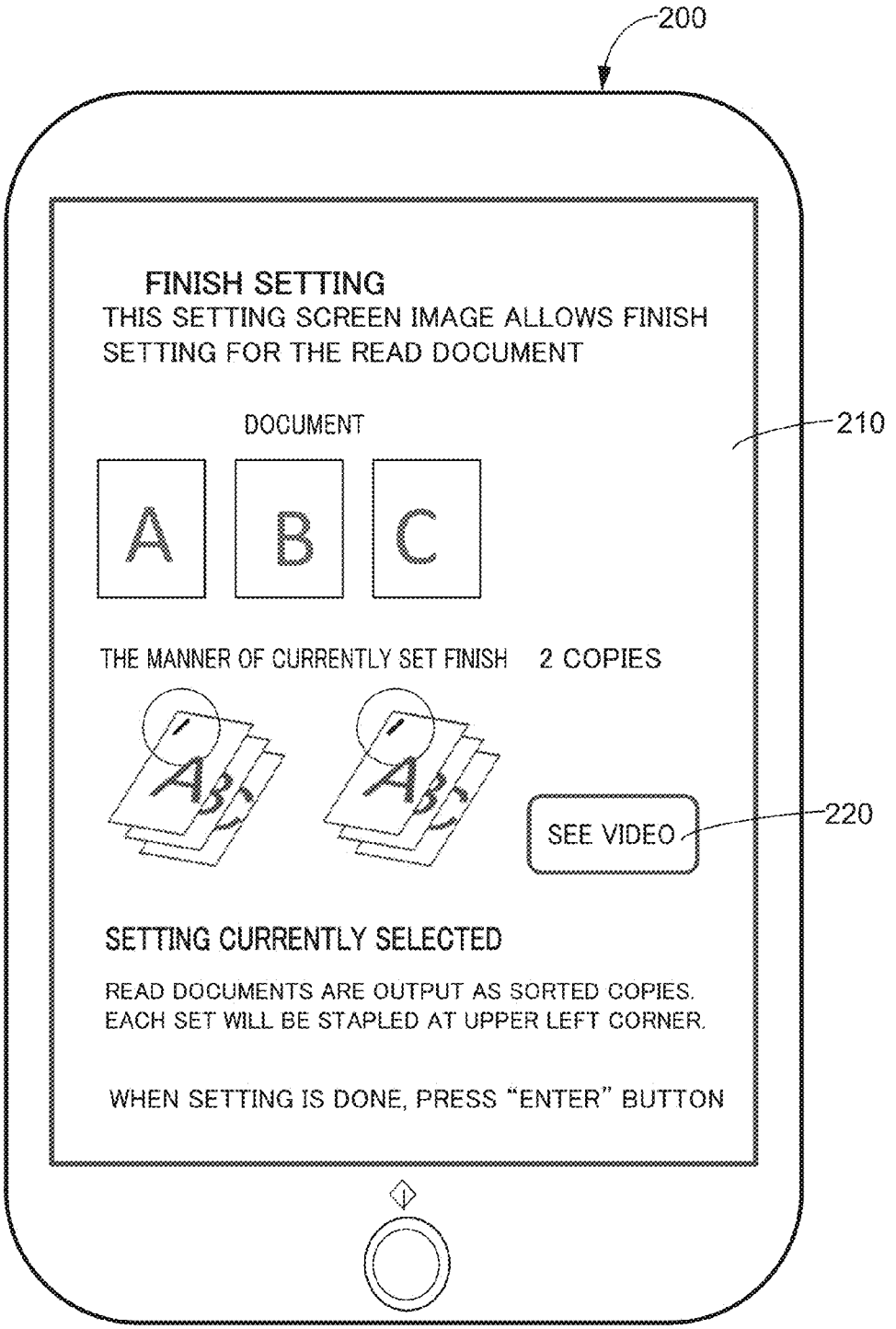

100
150
START
132
130
DISCHARGE TO: OFFSET TRAY
FINISH SETTING
SORT
STABLE SORT
PUNCH
OFFSET
1 POINT BINDING
2 POINTS BINDING
FRONT
1 POINT BINDING
ENTER
X
152
154
156
158
160
162
164
166
168

FIG. 9


200
FINISH SETTING
THIS SETTING SCREEN IMAGE ALLOWS FINISH SETTING FOR THE READ DOCUMENT
DOCUMENT
A
B
C
210
THE MANNER OF CURRENTLY SET FINISH 2 COPIES
SEE VIDEO
220
SETTING CURRENTLY SELECTED
READ DOCUMENTS ARE OUTPUT AS SORTED COPIES. EACH SET WILL BE STAPLED AT UPPER LEFT CORNER.
WHEN SETTING IS DONE, PRESS "ENTER" BUTTON

DISPLAY SYSTEM AND ELECTRONIC DEVICE

CROSS-REFERENCE TO RELATED APPLICATION

[0001] This nonprovisional application claims priority under 35 U.S.C. §119(a) on Patent Application No. 2013-119663 filed in Japan on Jun. 6, 2013, the entire contents of which are hereby incorporated by reference.

BACKGROUND OF THE INVENTION

[0002] 1. Field of the Invention

[0003] The present invention relates to a display system and an electronic device included in the display system and, more specifically, to a technique for displaying an operation manual of the electronic device.

[0004] 2. Description of the Background Art

[0005] Recently, digital multifunctional peripherals integrally having a plurality of functions such as copy function, printer function and FAX function are installed in many offices and places of business. Typically, a paper-based operation manual (instruction booklet) is attached to an electronic device such as the digital multifunctional peripheral. In these days, electronic devices come to have many functions and accordingly, the number of pages of the operation manuals is increasing. As a result, the cost for printing the operation manuals increased, and the cost of printing comes to be a burden on manufacturers. In order to reduce printing cost, for recent digital multifunctional peripherals, operation manuals based on electronic database (E-manual) come to be commonly used.

[0006] By way of example, Japanese Patent Laying-Open No. 2003-198767 (hereinafter referred to as '767 Reference) discloses a digital copy machine using such a manual based on electronic database. The digital copy machine according to '767 Reference has the service manual stored in a hard disk, and the service manual can be updated by a service person.

[0007] In an apparatus such as a digital multifunctional peripheral in which an operation panel is provided as a dedicated user interface (hereinafter, user interface will be denoted as "UI"), when the operation manual is displayed on the UI screen (display device), the operation manual fully occupies the UI screen. Therefore, operation while viewing the manual is difficult. Further, in a conventional digital multifunctional peripheral, in order to display that portion of the manual which corresponds to the operation the user is currently doing, a desired piece of information must be searched out from descriptions related to many functions, and at that time, for example, a number of click operations are necessary. Such a procedure requires time and effort. The digital copy machine described in '767 Reference also has the same problem.

[0008] As a solution to such a problem, Japanese Patent Laying-Open No. 2010-219879 (hereinafter referred to as '879 Reference) discloses a help information providing system for displaying help information in accordance with a state of digital multifunctional peripheral on a portable telephone. The help information providing system according to '879 Reference includes a digital multifunctional peripheral, a help server providing the help information for the digital multifunctional peripheral, and a portable telephone for displaying the help information provided by the help server. The digital multifunctional peripheral, the help server and the portable telephone are connected to a network. The digital multifunctional peripheral transmits its own device ID and a state code to the help server. The portable telephone extracts a marker image attached to the digital multifunctional peripheral from a photo image data picked-up for the digital multifunctional peripheral, obtains the device ID and a surface code of the digital multifunctional peripheral from the marker image, and transmits the obtained ID and code to the help server. Based on the device ID and the state code transmitted from the digital multifunctional peripheral and on the device ID and the surface code transmitted from the portable telephone, the help server transmits help information corresponding to the state of digital multifunctional peripheral to the portable telephone. Further, the portable telephone combines the help information transmitted from the help server with the photo image data to generate and display image data for providing help information.

[0009] In the help information providing system according to '879 Reference, in order to display the help information corresponding to the state of digital multifunctional peripheral on the portable telephone, it is necessary to extract a marker image attached to the digital multifunctional peripheral from the photo image data of the digital multifunctional peripheral, to obtain the device ID and the surface code of the digital multifunctional peripheral from the marker image, and to transmit these to the help server. Therefore, the operation for displaying the help information on the portable telephone requires much time and effort.

SUMMARY OF THE INVENTION

[0010] Therefore, it is desirable to provide a display system and an electronic device allowing operation of the device while viewing its operation manual.

[0011] According to a first aspect, the present invention provides a display system, including an electronic device and a terminal device transmitting/receiving information to/from the electronic device through wireless communication. In the display system, the electronic device includes: a communication unit conducting wireless communication with the terminal device; a receiving unit receiving an operation by a user; an establishing unit, detecting the terminal device and establishing wireless communication with the detected terminal device through the communication unit; and a transmission unit, responsive to establishment of wireless communication by the establishing unit, for transmitting, through the communication unit, a display request for displaying operation information related to the operation received by the receiving unit of an operation manual of the electronic device itself to the terminal device. The terminal device includes: a display portion displaying the operation manual; a wireless communication unit conducting wireless communication with the electronic device; and a display control unit, responsive to reception of the display request transmitted from the electronic device through the wireless communication unit, for controlling the display portion such that the requested operation information of the operation manual is displayed.

[0012] The electronic device establishes wireless communication with the detected terminal device. When wireless communication is established, the electronic device transmits to the terminal device a request for displaying operation information related to the operation received by the receiving unit, of the operation manual. Upon reception of the display

request transmitted from the electronic device, the terminal device displays the requested operation information of the operation manual.

[0013] In this manner, in the present display system, when the electronic device detects a terminal device and establishes wireless communication, the operation manual is displayed on the terminal device with which the wireless communication has been established. Since the operation manual is displayed on the terminal device in response to establishment of wireless communication, troublesome operation is unnecessary when the operation manual is to be displayed on the terminal device. Since the operation manual of electronic device is displayed on the terminal device as an external device, it is possible to operate the electronic device while viewing the operation manual. Further, since operation information related to the currently on-going operation received by the receiving unit is displayed on the terminal device, it is unnecessary to search a desired piece of information from descriptions of many functions. Therefore, the time and effort to find the target portion of the manual (operation information) can be saved.

[0014] Preferably, the establishing unit includes a unit, detecting, when the terminal device is waved over the electronic device, the terminal device and for establishing wireless communication with the detected terminal device through the communication unit. Since wireless communication between the electronic device and the terminal device is established by waving the terminal device over the electronic device, the desired portion of the manual (operation information) of the electronic device can more easily be displayed on the terminal device.

[0015] More preferably, the receiving unit includes a display unit displaying an operation screen image for receiving an operation by a user; and the display control unit includes a unit for controlling the display portion such that operation information of the operation manual corresponding to the operation screen image displayed on the display unit is displayed. Thus, the operation information related to the user's operation can more easily be displayed on the terminal device.

[0016] More preferably, the display unit includes a unit for making a transition of the operation screen image in accordance with an operation by the user; the transmission unit includes a unit, responsive to the transition of the operation screen image, for transmitting a display request for displaying the operation information corresponding to the operation screen image after the transition, to the terminal device; and the unit for controlling the display portion includes a unit for switching display of the display portion based on the display request transmitted from the unit for transmitting the display request to the terminal device. Thus, the operation information related to the user's operation can still more easily be displayed on the terminal device.

[0017] More preferably, the terminal device further includes a unit for transmitting terminal information including information as to whether it holds data of the operation manual or not, to the electronic device; and the electronic device includes a storage unit storing the data of the operation manual, a determining unit, responsive to reception of the terminal information, for determining whether the terminal device holds the data of the operation manual, based on the terminal information, and a unit, responsive to a determination by the determining unit that the terminal device does not hold the data of the operation manual, for transmitting data of the operation manual stored in the storage unit to the terminal device. When the terminal device does not have the data of operation manual, the electronic device transmits the data of operation manual to the terminal device. Therefore, even if the terminal device does not have the operation manual beforehand, it is possible to have the operation manual displayed on the terminal device.

[0018] More preferably, the terminal device further includes a unit, responsive to disconnection of wireless communication with the electronic device, for controlling the display portion such that display of the operation manual is turned off. The terminal device may be configured such that the data of operation manual is removed when wireless communication with the electronic device is disconnected.

[0019] According to a second aspect, the present invention provides an electronic device capable of communication with an external terminal device. The terminal device is capable of displaying an operation manual of the electronic device. The electronic device includes: a communication unit conducting wireless communication with the terminal device; a receiving unit for receiving an operation by a user; an establishing unit, detecting the terminal device, for establishing wireless communication with the detected terminal device through the communication unit; and a unit, responsive to establishment of wireless communication by the establishing unit, for transmitting a display request requesting display of operation information related to the operation received by the receiving unit of the operation manual through the communication unit to the terminal device.

[0020] Preferably, the establishing unit includes a unit for detecting, when the terminal device is waved over the electronic device, the terminal device and establishing wireless communication with the detected terminal device through the communication unit.

[0021] More preferably, the terminal device has a function of transmitting terminal information including information as to whether it holds data of the operation manual or not, to the electronic device; and the electronic device includes a storage unit storing the data of the operation manual, a determining unit, responsive to reception of the terminal information transmitted from the terminal device, for determining whether the terminal device holds the data of the operation manual, based on the terminal information, and a unit, responsive to a determination by the determining unit that the terminal device does not hold the data of the operation manual, for transmitting data of the operation manual stored in the storage unit to the terminal device.

[0022] As described above, by the present invention, a display system and an electronic device allowing operation of the device while viewing the operation manual without necessitating any troublesome operation can be provided.

[0023] The foregoing and other objects, features, aspects and advantages of the present invention will become more apparent from the following detailed description of the present invention when taken in conjunction with the accompanying drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

[0024] FIG. **1** schematically shows an overall configuration of the display system in accordance with a first embodiment of the present invention.

[0025] FIG. **2** is a control block diagram showing hardware configuration of the image forming apparatus shown in FIG. **1**.

[0026] FIG. **3** shows a display panel unit of the image forming apparatus shown in FIG. **1**.

[0027] FIG. **4** is a control block diagram showing hardware configuration of the tablet terminal shown in FIG. **1**.

[0028] FIG. **5** is a flowchart representing a control structure of a program executed by the image forming apparatus shown in FIG. **1**.

[0029] FIG. **6** is a flowchart representing a control structure of a program executed by the tablet terminal shown in FIG. **1**.

[0030] FIG. **7** shows an example of a display screen image displayed on the tablet terminal shown in FIG. **1**.

[0031] FIG. **8** shows a display panel unit of the image forming apparatus.

[0032] FIG. **9** shows another example of the display screen image displayed on the tablet terminal.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

[0033] In the following embodiment, the same components are denoted by the same reference characters. Their functions and names are also the same. Therefore, detailed description thereof will not be repeated.

First Embodiment

Overall System Configuration

[0034] Referring to FIG. **1**, the overall configuration of a display system **50** in accordance with the present embodiment will be described. Display system **50** includes an image forming apparatus **100** and a tablet terminal **200**. Image forming apparatus **100** and tablet terminal **200** are capable of transmitting/receiving signals to and from each other by near field communication (NFC).

[0035] Image forming apparatus **100** is, for example, a digital multifunctional peripheral (MFP) having a copy function and a printer function. Image forming apparatus **100** has a so-called laser printing (electrophotography) function, utilizing laser light for exposure. The apparatus, however, may have a different type printing function.

[0036] Tablet terminal **200** is, for example, a tablet type portable terminal having a display screen of about 10 inches. Tablet terminal **200** has an NFC module (not shown) for near field communication with image forming apparatus **100**. NFC is a technique for short distance wireless communication enabling data communication at a short distance of about a few to several tens centimeters. Since it has the NFC module mounted thereon, when one moves tablet terminal **200** close to and wave over a prescribed portion of image forming apparatus **100**, bi-directional communication becomes possible between tablet terminal **200** and image forming apparatus **100**.

[0037] In the present embodiment, when tablet terminal **200** is waved over image forming apparatus **100** while a user is operating image forming apparatus **100**, an operation manual (operation manual related to the on-going operation) of image forming apparatus **100** is displayed on tablet terminal **200**.

[0038] [Hardware Configuration]

[0039] <<Image Forming Apparatus>>

[0040] Referring to FIG. **2**, image forming apparatus **100** includes a control unit **110**, a storage unit **120**, a display panel unit **130** and a wireless communication driver **140**.

[0041] Control unit **110** is substantially a computer, and it includes a CPU (Central Processing Unit), an ROM (Read Only Memory), and an RAM (Random Access Memory), all not shown. The CPU executes various computer programs in accordance with instructions from display panel unit **130**, tablet terminal **200** and the like, and thereby realizes operations of various portions and units of image forming apparatus **100** and executes desired processes such as communication with an external device such as tablet terminal **200**. The various programs mentioned above are stored in the ROM or storage unit **120** in advance, and when a desired process is executed, read from the ROM or storage unit **120** and transferred to the RAM. The CPU reads and interprets a program instruction from an address in the RAM designated by a value stored in a register, called a program counter, not shown, in the CPU. Further, the CPU reads data necessary for computation from an address designated by the read instruction, and executes a computation corresponding to the instruction, on the data. The results of execution are also stored in an address designated by the instruction, in the RAM, storage unit **120** or the register in CPU.

[0042] Control unit **110** further includes a terminal detecting unit **112** executing a process for detecting wireless communication with tablet terminal **200**, a terminal control unit **114** executing a process for transmitting a request (terminal information request) asking terminal information to the detected tablet terminal **200**, a manual data editing unit **116** executing a process for editing manual data, as the electronic data of operation manual, and a display panel control unit **118** controlling display on display panel unit **130**.

[0043] Storage unit **120** stores a computer program for realizing general operations of image forming apparatus **100**. The computer program is provided, for example, from an information processing apparatus, through wireless communication driver **140**. The computer program may be provided by a storage medium, such as a DVD, recording the computer program. Specifically, a DVD as a recording medium recording the computer program may be loaded to a DVD drive (not shown) built-in in image forming apparatus **100**, and the computer program may be read from the DVD and installed in storage unit **120**. Storage unit **120** further stores a computer program for executing a process for displaying the operation manual on tablet terminal **200**, and various data including image data.

[0044] Storage unit **120** further includes a computer program storage unit **122** for storing the computer programs described above, a manual data storage unit **124** for storing the operation manual (manual data) of itself, and a terminal application storage unit **126** for storing a dedicated application (hereinafter referred to as "manual display application") for displaying the operation manual on tablet terminal **200**.

[0045] Referring to FIGS. **2** and **3**, display panel unit **130** is a touch-panel integrated type liquid crystal display device, formed by superposing a display and a touch-panel. Display panel unit **130** provides various pieces of information related to the state of image forming apparatus **100** and related to the state of various processes to the user. Further, the touch-panel display provides an interactive operation interface (user interface) to the user. The interactive operation interface receives a user instruction (operation) for the overall operation of image forming apparatus **100** through the touch-panel, displays the contents of instruction on the display, and outputs a control signal in accordance with the instruction to, for example, control unit **110**. Specifically, on display panel unit

130, an operation screen image is displayed, and when the operation screen image is operated by the user, image forming apparatus **100** receives an instruction in accordance with the operation. The operation screen image displayed on display panel unit **130** may make a transition in response to a user operation. Display panel unit **130** further includes a wireless communication unit **132** over which tablet terminal **200** is waved, when near field communication is to take place with tablet terminal **200**.

[0046] Referring to FIG. **2**, wireless communication driver **140** has a functional unit realizing near field communication for wireless communication with tablet terminal **200**. Image forming apparatus **100** is capable of data communication with tablet terminal **200** having the NFC module, in accordance with a communication protocol in compliance with NFC standard, through wireless communication driver **140**. Wireless communication driver **140** may have a function to provide an interface to a network. Then, image forming apparatus **100** will be capable of data communication in accordance with a prescribed communication protocol with an information processing apparatus or the like on the network. By way of example, image forming apparatus **100** may receive instruction signals instructing execution of various processes including a print job from the information processing apparatus, through wireless communication driver **140**.

[0047] Image forming apparatus **100** further stores, in storage unit **120**, an association table (not shown) storing association between each of the operation screen images displayed on display panel unit **130** and pieces of information (manual position information (for example, page number of the operation manual)) representing the position where the operation information (manual) corresponding to each operation screen image is described. The association table is used when the manual corresponding to the operation screen image that is being displayed on display panel unit **130** is to be displayed on tablet terminal **200**. When a plurality of operation manuals are provided, the association table should preferably store the types of operation manuals in association with the operation screen images.

[0048] Image forming apparatus **100** further includes functional units for image formation, such as an image reading unit (scanner unit), an image processing unit and an image forming unit. The structures of these functional units are the same as those of a conventional image forming apparatus (MFP) and, therefore, description thereof will not be given here.

[0049] <<Tablet Terminal **200**>>

[0050] Referring to FIG. **4**, tablet terminal **200** forming display system **50** includes a CPU **202**, a memory **204**, an RAM **206** and a bus **208**. CPU **202** is for overall control of tablet terminal **200**. Memory **204** is an electrically rewritable non-volatile storage device, such as a flash memory. Memory **204** stores programs and data necessary for controlling the operation of tablet terminal **200**.

[0051] CPU **202**, memory **204** and RAM **206** are connected to bus **208**. Exchange of data (including control information) between each of these units is done through bus **208**. CPU **202** reads a program from memory **204** through bus **208** to RAM **206**, and executes the program using a part of RAM **206** as a work area. Specifically, CPU **202** controls various units forming tablet terminal **200** in accordance with the program stored in memory **204**, to realize each of the functions of tablet terminal **200**. The computer program may be provided by a storage medium such as a DVD recording the computer program. Further, the computer program may be provided from an information processing apparatus or the like on a network through the network.

[0052] Tablet terminal **200** further includes a touch-panel display **210**, a display control unit **212** and a wireless communication interface (hereinafter referred to as "wireless communication I/F") **214**, all connected to bus **208**.

[0053] Touch-panel display **210** includes an input portion **210***a* implemented by a touch-panel, and a display portion **210***b* implemented by a display panel. Display portion **210***b* is, for example, a liquid crystal display panel. Display control unit **212** includes a driving unit for driving display portion **210***b*, and generates and outputs to display portion **210***b* a signal for reading image data stored in RAM **206** at a prescribed timing and displaying the image data as an image on display portion **210***b*. The image data to be displayed is read by CPU **202** from memory **204** and transferred to RAM **206**.

[0054] Wireless communication I/F **214** provides an interface with the network by radio wave. Wireless communication I/F **214** includes an NFC module for near field communication with image forming apparatus **100**. Tablet terminal **200** is capable of near field communication with image forming apparatus **100** through wireless communication I/F **214**.

[0055] [Software Configuration]

[0056] The process for displaying the operation manual of image forming apparatus **100** on tablet terminal in display system **50** in accordance with the present embodiment will be described.

[0057] Referring to FIG. **5**, the control structure of a computer program executed by image forming apparatus **100** to have the operation manual displayed on tablet terminal **200** will be described. The program is activated when image forming apparatus **100** is powered on.

[0058] The program includes: a step **S1000** of executing polling for detecting a communicable tablet terminal; and a step **1010**, executed following step **S1000**, of transmitting a request for terminal information of tablet terminal **200**, to the detected tablet terminal. Assume, for example, that tablet terminal **200** is detected as a communicable tablet at step **S1000**. The terminal information asked at step **S1010** includes information as to whether the detected tablet terminal **200** has a manual display application (whether or not a manual display application is installed), information as to whether the tablet holds (stores) manual data, and information related to the size of display screen of tablet terminal **200**.

[0059] The program further includes: a step **S1020**, executed following step **S1010**, of receiving terminal information transmitted from tablet terminal **200** in response to the request of terminal information; a step **S1030**, executed after step **S1020**, of determining whether or not the manual display application is installed in tablet terminal **200** based on the received terminal information, and branching the control flow in accordance with the result of determination; a step **S1040**, executed if it is determined at step **S1030** that the manual display application is not installed in tablet terminal **200**, of transferring (transmitting) the manual display application stored in terminal application storage unit **126** to tablet terminal **200**; and a step **S1050**, executed when it is determined at step **S1030** that the manual display application is installed in tablet terminal **200** and after step **S1040**, of determining whether or not tablet terminal **200** holds the manual data, based on the received terminal information, and branching the flow of control depending on the result of determination.

[0060] The program further includes: a step S**1060**, executed when it is determined at step S**1050** that tablet terminal **200** does not hold the manual data, of reading an operation manual (manual data) from manual data storage unit **124** in accordance with the contents of operation (operation information (manual) corresponding to the operation screen image displayed on display panel unit **130**) of image forming apparatus **100**, and editing the read operation manual (manual data) in accordance with the size of display screen of tablet terminal **200**; and a step S**1070**, executed following step S**1060**, of transferring the edited manual data to tablet terminal **200**. At step S**1060**, the manual data is compressed as needed. By way of example, if the size of display screen of tablet terminal **200** is small, the amount of communication at the time of data transfer can be reduced by compressing the manual data.

[0061] The program further includes: a step S**1080**, executed if it is determined at step S**1050** that tablet terminal **200** holds the manual data, of using the association table to look up and transfer information of the position where the operation information (manual) corresponding to the operation screen image displayed on display panel unit **130** is described (manual information (for example, page number)), to tablet terminal **200**; and a step S**1090**, executed after steps S**1070** and S**1080**, of executing a process of detecting disconnection of communication. When the process of step S**1090** ends, that is, when disconnection of communication is detected, the control returns to step S**1000**.

[0062] Referring to FIG. **6**, the control structure of a computer program executed by tablet terminal **200** for displaying the operation manual will be described. The program is activated when tablet terminal **200** is powered on. In the following, it is assumed that while image forming apparatus **100** is being operated, the user waves tablet terminal **200** over wireless communication unit **132** (see FIG. **3**) of image forming apparatus **100**.

[0063] The program includes: a step **2000** of receiving a communication detection request (polling request) from image forming apparatus **100**; a step S**2010**, executed following step S**2000**, of transmitting a response to image forming apparatus **100**; a step S**2020**, executed following step S**2010**, of receiving a request (request asking terminal information) transmitted from image forming apparatus **100**; and a step S**2030**, executed following step S**2020**, of transmitting the terminal information of its own to image forming apparatus **100**.

[0064] The program further includes: a step S**2040**, executed following step S**2030**, of determining whether the terminal holds a manual display application (whether or not it has a manual display application installed in itself), and branching the flow of control depending on the result of determination; a step S**2050**, executed if it is determined at step S**2040** that the manual display application is not held, of receiving a manual display application transferred from image forming apparatus **100**; and a step S**2060**, executed if it is determined at step S**2040** that a manual display application is held and after step S**2050**, of activating the manual display application.

[0065] The program further includes; a step S**2070**, executed following step S**2060**, of determining whether or not the manual data is held (stored), and branching the flow of control depending on the result of determination; a step S**2080**, executed if it is determined at step S**2070** that the manual data is not held, of receiving manual data transmitted from image forming apparatus **100**; and a step S**2090**, executed if it is determined at step S**2070** that the manual data is held, of receiving the manual position information transmitted from image forming apparatus **100**.

[0066] The program further includes: a step S**2100**, executed after steps S**2080** and S**2090**, of displaying the operation manual using the manual display application; and a step S**2110**, executed following step S**2010**, of executing a process of detecting disconnection of communication. When the process of step S**2110** ends, that is, when disconnection of communication is detected, the control returns to step S**2000**.

[0067] [Operation]

[0068] Display system **50** in accordance with the present embodiment operates in the following manner.

[0069] Image forming apparatus **100** is capable of near field communication with a terminal having an NFC module mounted thereon. Terminal detecting unit **112** of image forming apparatus **100** executes polling for detecting a communicable terminal (tablet terminal) through wireless communication driver **140** (step S**1000** shown in FIG. **5**). Assume that tablet terminal **200** is waved over wireless communication unit **132** (see FIG. **3**) of image forming apparatus **100** while image forming apparatus **100** is in operation. Since tablet terminal **200** is in the vicinity of image forming apparatus **100**, it can receive the polling request from image forming apparatus **100**. Receiving the polling request (step S**2000** shown in FIG. **6**), tablet terminal **200** transmits a response to image forming apparatus **100** (step S**2010**). Receiving the response from tablet terminal **200**, image forming apparatus **100** establishes wireless communication with tablet terminal **200**. Thus, bi-directional communication becomes possible between tablet terminal **200** and image forming apparatus **100**.

[0070] When image forming apparatus **100** receives a response of polling (response transmitted from tablet terminal **200**) through wireless communication driver **140**, terminal control unit **114** transmits request for terminal information to detected tablet terminal **200** (step S**1010** shown in FIG. **5**). Receiving the request from image forming apparatus **100** (step S**2020** shown in FIG. **6**), tablet terminal **200** transmits the terminal information of itself to image forming apparatus **100** (step S**2030**).

[0071] Receiving the terminal information from tablet terminal **200** (step S**1020** shown in FIG. **5**), image forming apparatus **100** determines, based on the terminal information, whether or not a manual display application is installed in tablet terminal **200** (step S**1030**) and whether tablet terminal **200** holds the manual data (step S**1050**). Further, image forming apparatus **100** recognizes the size of display screen of tablet terminal **200** based on the terminal information.

[0072] If no manual display application is installed in tablet terminal **200** (NO at step S**1030**), image forming apparatus **100** retrieves a manual display application from terminal application storage unit **126** and transfers the application to tablet terminal **200** (step S**1040**).

[0073] If tablet terminal **200** does not have the manual data (NO at step S**1050**), image forming apparatus **100** references the association table, retrieves the manual data corresponding to the contents of operation being done on image forming apparatus **100** from manual data storage unit **124**, and transfers it to tablet terminal **200** (steps S**1060** and S**1070**). By transferring the manual data, image forming apparatus **100** requests tablet terminal **200** to display the operation manual. At this time, manual data editing unit **116** edits the manual

data read from manual data storage unit **124** if it is necessary from the size of display screen of tablet terminal **200**. By way of example, when the size of display screen of tablet terminal **200** is smaller than a prescribed size, manual data editing unit **116** executes the process of compressing the manual data. Thus, the amount of communication at the time of transfer can be reduced. On the other hand, if tablet terminal **200** has the manual data, image forming apparatus **100** transmits only the information of position (manual position information (for example, page number)) where the operation information (manual) corresponding to the operation screen image being displayed on display panel unit **130** is described to tablet terminal **200**. By transmitting the manual position information, image forming apparatus **100** requests tablet terminal **200** to display the operation manual.

[0074] When the manual display application is installed in itself (YES at step S**2040**), tablet terminal **200** activates the manual display application (step S**2060**). On the other hand, if the manual display application is not installed in itself (NO at step S**2040**), tablet terminal **200** receives the manual display application from image forming apparatus **100** (step S**2050**), and activates the received application (S**2060**).

[0075] If tablet terminal **200** already holds the manual data of operation manual of image forming apparatus **100** (YES at step S**2070**), tablet terminal **200** receives the manual position information from image forming apparatus (step S**2090**), and displays the operation information (manual) indicated by the manual position information by manual display application (step S**2100**). On tablet terminal **200**, the manual (operation information) corresponding to the operation screen image displayed on display panel unit **130** of image forming apparatus **100** is displayed.

[0076] On the other hand, if tablet terminal **200** does not hold the manual data of operation manual (NO at step S**2070**), tablet terminal **200** receives the manual data from image forming apparatus **100** (step S**2080**), and displays the manual data by the manual display application (step S**2100**). Here again, on tablet terminal **200**, the manual (operation information) corresponding to the operation screen image displayed on display panel unit **130** of image forming apparatus **100** is displayed.

[0077] Referring to FIG. **3**, assume that on display panel unit **130** of image forming apparatus **100**, operation screen image **150** for setting, for example, finishing process, is displayed. The operation screen image **150** includes various buttons for finish settings. Specifically, operation screen image **150** includes a "SORT" button **152** for sorting, a "STAPLE SORT" button **154** for stapling and sorting, a check box **156** checked to set punching, and a check box **158** checked to set offset. Operation screen image **150** further includes buttons **160** to **164** for setting positions of stapling when "STAPLE SORT" button **154** is operated (when stapling and sorting is set), an "ENTER" button **166** for entering the setting, and a button **168** for closing the finish setting screen image (operation screen image **150**). Button **160** is for setting deep one point binding, button **162** is for setting two-point binding, and button **164** is for setting front one point binding.

[0078] When tablet terminal **200** is waved over wireless communication unit **132** of image forming apparatus **100** while operation screen image **150** is being operated, image forming apparatus **100** and tablet terminal **200** communicate with each other. Referring to FIG. **7**, on touch-panel display **210** of tablet terminal **200**, a manual (operation information) corresponding to operation screen image **150** is displayed.

[0079] When terminal detecting unit **112** of image forming apparatus **100** detects disconnection of communication with tablet terminal **200** through wireless communication driver **140** (step S**1090** shown in FIG. **5**), it resumes a state (step S**1000**) for detecting communication connection again. By way of example, if tablet terminal **200** is moved and the distance between tablet terminal **200** and image forming apparatus **100** becomes longer and exceeds the communication range, communication is disconnected.

Effects of the Present Embodiment

[0080] As is apparent from the description above, by using display system **50** in accordance with the present embodiment, the following effects can be attained.

[0081] Image forming apparatus **100** detects tablet terminal **200** and establishes wireless communication with the detected tablet terminal **200**. When wireless communication is established, image forming apparatus **100** transmits a request for displaying the operation information (manual) related to the currently on-going operation to tablet terminal **200**. Receiving the display request transmitted from image forming apparatus **100**, tablet terminal **200** displays the requested operation information (manual) of the operation manual.

[0082] In this manner, in the present display system **50**, when image forming apparatus **100** detects tablet terminal **200** and establishes wireless communication, it causes tablet terminal **200**, with which the wireless communication is established, to display the operation manual. Since the operation manual is displayed on tablet terminal **200** when wireless communication is established, no troublesome operation is necessary to display the operation manual on tablet terminal **200**. Since the operation manual of image forming apparatus **100** is displayed on tablet terminal **200** as an external device, it is possible to operate image forming apparatus **100** while viewing the operation manual. Further, since the operation information (manual) related to the currently on-going operation is displayed on tablet terminal **200**, it is unnecessary to search for a desired piece of information from descriptions of many functions. Therefore, time and effort to find the target manual (operation information) can be saved.

Second Embodiment

[0083] A display system in accordance with the present embodiment has the same configuration as display system **50** in accordance with the first embodiment except that the tablet terminal has a security setting function. When disconnection of communication with the image forming apparatus is detected, the tablet terminal stops display of the manual that has been displayed, in accordance with security setting.

[0084] The tablet terminal may be configured to stop display of the manual until communication with the image forming apparatus is again detected, or it may be configured such that the manual data is deleted when disconnection of communication with the image forming apparatus is detected.

[0085] Such configurations are effective when the operation manual of the image forming apparatus is for internal use only and not to be taken out.

(Modifications)

[0086] In the embodiment above, an example in which the present invention is applied to an image forming apparatus as an exemplary electronic device has been described. The present invention, however, is not limited to such an embodiment. The electronic device forming the display system may be a device other than the image forming apparatus. Further, though an example has been described in which the present invention is applied to a multifunctional peripheral as an exemplary electronic device, the image forming apparatus may be other than the multifunctional peripheral. By way of example, it may be an image forming apparatus such as a printer or a copy machine.

[0087] Though an example has been described in which the present invention is applied to a tablet terminal as an example of terminal device in the embodiment above, the present invention is not limited to such an embodiment. The terminal device forming the display system may be a device other than the tablet terminal.

[0088] Though an example has been described in which wireless communication between the image forming apparatus and the tablet terminal is realized by near field communication (NFC) in the embodiment above, the present invention is not limited to such an embodiment. The wireless communication between the image forming apparatus and the tablet terminal may be other than near field communication. By way of example, it may be realized by short-distance wireless communication such as Bluetooth (registered trademark), or by wireless LAN.

[0089] Further, the image forming apparatus and the tablet terminal may each be configured to have a number of different types of wireless communication functions. By way of example, the image forming apparatus and the tablet terminal may each be configured to have the wireless communication functions of NFC and Bluetooth. In that case, it is preferable that communication procedure (pairing) of Bluetooth can be executed through wireless communication by NFC. By such an approach, even when wireless communication by NFC is disconnected, wireless communication between the devices is possible by Bluetooth. Though it is necessary to keep the tablet terminal close to the image forming apparatus when wireless communication is realized by NFC, Bluetooth has relatively long communication distance and, therefore, connection for communication can be maintained even when the tablet terminal is to some extent away from the image forming apparatus, if wireless communication is realized by Bluetooth.

[0090] When the image forming apparatus and the tablet terminal have a plurality of different types of wireless communication functions, a large amount of data such as manual data or application may be transmitted using wireless communication having higher speed of communication. By way of example, Bluetooth has higher speed of communication than NFC. Therefore, when pairing of Bluetooth is executed by wireless communication using NFC, data of large capacity may be transmitted by wireless communication using Bluetooth.

[0091] In the embodiment above, it is possible to continuously operate the image forming apparatus even while the operation manual is displayed on the tablet terminal. When the user operates the operation screen image displayed on the display panel unit, the image forming apparatus receives an instruction corresponding to the operation. In that case, the operation screen image may make a transition in response to the user operation. It is desirable that the image forming apparatus is configured to transmit manual position information corresponding to the operation screen image as changed by the transition to the tablet terminal. By such an approach, it becomes possible, when the operation screen image makes a transition, to have the operation information (manual) corresponding to the operation screen image as changed after transition, on the tablet terminal. Specifically, as the operation screen image makes a transition, the manual displayed on the tablet terminal can be switched to the manual corresponding to the operation screen image after transition.

[0092] In the embodiment above, when the data rate of wireless communication is not high, the image forming apparatus may transmit the manual data to the tablet terminal after processing the data, for example, after compressing the data.

[0093] Though an example in which the manual corresponding to the operation screen image of the image forming apparatus is displayed on the tablet terminal has been described in the embodiment above, the present invention is not limited to such an embodiment. It has only to be configured such that while the user is operating the image forming apparatus, the manual related to the currently on-going operation is displayed on the tablet terminal. By way of example, if an operation key (for example, a hard key) outside of the operation screen image is operated and the information of key operation is not displayed on the operation screen image, operation information related to the key operation may be displayed on the tablet.

[0094] Further, when a tablet terminal is waved over the wireless communication unit of image forming apparatus while a desired button on the operation screen image is being selected, the manual (operation information) related to the selected button may be displayed on the tablet. Referring to FIG. **8**, by way of example, on operation screen image **150**, assume that "STAPLE SORT" button **154** and a button **160** for setting deep one point binding are selected. When the tablet terminal is waved over the wireless communication unit of image forming apparatus in this situation, the manual related to the buttons that are being selected in relation to the finish settings may be displayed on the touch-panel display of tablet terminal. Since the tablet terminal advantageously has a large size and high resolution, it is possible to easily confirm the finished state resulting from the settings.

[0095] The operation manual displayed on the tablet terminal may or may not have the same configuration as the operation manual displayed on the display panel unit of the image forming apparatus. The operation manual of a different configuration may include one having larger amount of information than that displayed on the display panel unit of image forming apparatus. Further, the operation manual displayed on the tablet terminal may be a movie. Specifically, the operation manual may be presented as video display. In that case, by way of example, a button **220** (such as "SEE VIDEO") may be arranged for playing video in the operation manual of still image and the video reproduction may be started when button **220** is pressed.

[0096] The data format of manual data for the operation manual is not specifically limited. By way of example, the format of manual data may be PDF or HTML or other format.

[0097] Though an example in which the manual is displayed on the tablet terminal using a dedicated application (manual display application) has been described in the embodiment above, the present invention is not limited to

such an embodiment. The tablet terminal may be configured to display the operation manual using, for example, a general browser.

[0098] Though an example in which a security process such as stopping display of manual data by providing a security function on the tablet terminal has been described in the second embodiment above, the present invention is not limited to such an embodiment. The security process is not limited to the one executed on the side of tablet terminal after the communication between the image forming apparatus and the tablet terminal is disconnected, and it may be realized by an instruction from the image forming apparatus to the tablet terminal. For instance, after the image forming apparatus is connected to the tablet terminal by NFC as described above, the image forming apparatus can establish wireless communication with the tablet terminal using a different communication standard (for example, Bluetooth). Here, even when the wireless communication by NFC is lost as the distance between the image forming apparatus and the tablet terminal increases, it is possible to instruct deletion of manual data, for example, from the image forming apparatus to the tablet terminal if the wireless communication by another communication standard is maintained.

[0099] The embodiments as have been described here are mere examples and should not be interpreted as restrictive. The scope of the present invention is determined by each of the claims with appropriate consideration of the written description of the embodiments and embraces modifications within the meaning of, and equivalent to, the languages in the claims.

What is claimed is:

1. A display system, including an electronic device and a terminal device transmitting/receiving information to/from said electronic device through wireless communication, wherein

said electronic device includes

a communication unit conducting wireless communication with said terminal device,

a receiving unit receiving an operation by a user,

an establishing unit, detecting said terminal device and establishing wireless communication with said detected terminal device through said communication unit, and

a transmission unit, responsive to establishment of wireless communication by said establishing unit, for transmitting, through said communication unit, a display request for displaying operation information related to the operation received by said receiving unit of an operation manual of the electronic device itself to said terminal device; and

said terminal device includes

a display portion displaying said operation manual,

a wireless communication unit conducting wireless communication with said electronic device, and

a display control unit, responsive to reception of said display request transmitted from said electronic device through said wireless communication unit, for controlling said display portion such that the requested operation information of said operation manual is displayed.

2. The display system according to claim **1**, wherein said establishing unit includes a unit, detecting, when said terminal device is waved over said electronic device, said terminal device and for establishing wireless communication with said detected terminal device through said communication unit.

3. The display system according to claim **1**, wherein

said receiving unit includes a display unit displaying an operation screen image for receiving an operation by a user; and

said display control unit includes a unit for controlling said display portion such that operation information of said operation manual corresponding to the operation screen image displayed on said display unit is displayed.

4. The display system according to claim **3**, wherein

said display unit includes a unit for making a transition of the operation screen image in accordance with an operation by the user;

said transmission unit includes a unit, responsive to the transition of the operation screen image, for transmitting a display request for displaying the operation information corresponding to the operation screen image after the transition, to said terminal device; and

said unit for controlling said display portion includes a unit for switching display of said display portion based on the display request transmitted from said unit for transmitting said display request to said terminal device.

5. The display system according to claim **1**, wherein

said terminal device further includes a unit for transmitting terminal information including information as to whether it holds data of said operation manual or not, to said electronic device; and

said electronic device includes

a storage unit storing the data of said operation manual,

a determining unit, responsive to reception of said terminal information, for determining whether said terminal device holds the data of said operation manual, based on the terminal information, and

a unit, responsive to a determination by said determining unit that said terminal device does not hold the data of said operation manual, for transmitting data of said operation manual stored in said storage unit to said terminal device.

6. The display system according to claim **1**, wherein said terminal device further includes a unit, responsive to disconnection of wireless communication with said electronic device, for controlling said display portion such that display of said operation manual is turned off.

7. An electronic device capable of communication with an external terminal device, wherein

said terminal device is capable of displaying an operation manual of said electronic device; and

said electronic device includes

a communication unit conducting wireless communication with said terminal device,

a receiving unit for receiving an operation by a user,

an establishing unit, detecting said terminal device, for establishing wireless communication with said detected terminal device through said communication unit, and

a unit, responsive to establishment of wireless communication by said establishing unit, for transmitting a display request requesting display of operation information related to the operation received by said receiving unit of said operation manual through said communication unit to said terminal device.

8. The electronic device according to claim **7**, wherein said establishing unit includes a unit for detecting, when said terminal device is waved over said electronic device, said

terminal device and establishing wireless communication with said detected terminal device through said communication unit.

9. The electronic device according to claim **7**, wherein

said terminal device has a function of transmitting terminal information including information as to whether it holds data of said operation manual or not, to said electronic device; and

said electronic device includes

a storage unit storing the data of said operation manual,

a determining unit, responsive to reception of said terminal information transmitted from said terminal device, for determining whether said terminal device holds the data of said operation manual, based on the terminal information, and

a unit, responsive to a determination by said determining unit that said terminal device does not hold the data of said operation manual, for transmitting data of said operation manual stored in said storage unit to said terminal device.

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